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UTILIZING THE SORGHUMS

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Domestic animals are storehouses of potential human food. These storehouses existed long before man erected elevators. When food is abundant it is fed freely to domestic animals, causing them to increase more rapidly than they are consumed. When food is scarce, animals are sold freely because it does not pay to feed them. An unusually large number of calves have gone to market this year because of the high price of food stuffs. Cows have been marketed during the past season because the income from milk and milk products at ruling prices did not pay for the cost of feed and labor. Chickens have been sold because the eggs would not pay for the grain they ate. Thus, probably, our natural stores are being consumed faster than they are being replenished. Had it not been for this fact, the cost of food would have gone still higher.

The process of increasing the supply of meat is slow. If every person in the United States would decide today to raise beef there would be no more cows tomorrow than there are today. High as meat products have been, the highest in many years, they have been lower than they otherwise would have been had not the high price of grains caused many farmers to sacrifice their animals. It seems reasonable to suppose that an abundant crop of Indian corn, oats, and barley will tend to check the sale of immature stock. If so, prices of meat must rise before they can fall. There can be no considerable increase of domestic animals until it becomes more profitable to feed coarse grains than to sell them upon the open market.

The first result of an abundant supply and lower price of grain will be to increase the breeding of hogs and to increase the production of butter and eggs. The increase of mutton will be slow, and of beef still slower. The high price of wool and of mutton will tend to increase the number of sheep, but while this increase is going on the marketing of sheep will be retarded.

More than one-half the expenditure for food in America is for meats or other forms of protein. To illustrate this fact, the following table is quoted from Circular No. 163 of this station, published in April, 1917:

Food Materials	Total expended per family Av. Min.	Av. Max.	Total Av. Min.	Av. Max
Protein—				
Milk	$ 68.40	$ 87.30		
Meat	136.80	194.00		
Eggs	28.50	72.75		
Beans	2.10	2.40	$235.80	$356.45
Fats—				
Butter	29.75	50.75		
Oil and fat	17.00	29.00	46.75	79.75
Starchy foods—				
Flour	22.80	24.25		
Cereals	12.00	13.58		
Macaroni	2.80	2.80		
Rice	2.10	2.40		
Potatoes	28.50	38.80	68.20	81.43
Fruits and vegetables—				
Fruits	28.50	48.50		
Green vegetables	27.36	34.92	55.86	83.42
Sugar—				
Sugar	19.00	27.20		
Tea and coffee	10.20	21.90	29.20	49.10
			$435.87	$650.55
Per person per day			$ 0.238	$ 0.356

Sundries, including such articles as chocolate, cornstarch, baking powder, sago, gelatine, flavorings, spices and all dainties and extras, have been omitted.

The family consists of father and mother, son 16, daughters 10 and 3 years, respectively.

In arriving at the figures here given potatoes and flour were estimated at five cents per pound, while meat was included at twenty cents per pound to the consumer. Important as potatoes are in our dietary, it will be noted that at five cents per pound, which is twice the normal price to the consumer, they represent approximately six per cent of the cost of food in an ordinary household. When a man goes into a restaurant for lunch he may obtain a meat order for thirty-five cents, a baked potato for five or ten cents, and have bread and butter included without extra charge. By far the easiest method of reducing the amount of expense for food is to reduce the amount of meat eaten. It is one of the readiest means of helping our allies. The reason more emphasis has been placed upon wheat than upon meats is because the decrease in the supply of meat is less obvious. The country has more than a one year's supply of meat.

One of the simplest ways of making possible an increased meat production in California is to raise sorghums either for grain or silage. If food products are to be increased and the price of foods lowered there must be a starting point somewhere. Under existing conditions that starting point is when the point of a plow enters the ground. There are many thousands of acres of land now producing under a scanty pasture perhaps less than fifty pounds of beef per acre, which can be made, if planted to grain sorghums, to produce 400 to 1000 pounds of pork or its equivalent of milk or eggs. Grain sorghums[1] can be fed to domestic animals under any circumstances where Indian corn or barley meal would be appropriate. They make in every way a satisfactory substitute. In other cases Indian corn or Sudan grass may be grown.

When to choose certain of these crops has been discussed by Gilmore as follows:

WHEN TO CHOOSE CERTAIN CROPS

Sorghums—

Sorghums are primarily dry land crops, although they respond to irrigation. They are planted after the soil becomes warm and dangers of severe cold are over.

The sorghums are most economically grown where they can be fed on the land where grown. The grain, however, has a market value, and is used largely for stock food.

During the growing season they should be cultivated as the destruction of weeds, the demands for moisture, and the maintenance of physical condition require.

Dwarf Milo—

1. For earliest planting (latter part of April). Germinates under wider range of moisture and temperature than others.
2. On heaviest and lightest soils. More hardy under adverse soil conditions.
3. When in doubt as to value of other varieties; apparently the most generally adaptable.

Feterita—

1. When bird damage to other varieties is expected. Birds seem to hold this variety in second choice.
2. When soil is in prime condition as to moisture and temperature. Feterita is less hardy than other varieties in this respect.
3. For mid-season planting (during May).

Egyptian Corn—

1. For late planting.
2. Where moisture supply is very deficient.

[1] The general term *"Grain Sorghum"* is here used to denote any of the non-saccarhine sorghums grown for their grain, such as dwarf milo, feterita and Egyptian corn.

3. Where forage is of little importance.

This variety is very similar to Milo in its adaptabilities and conditions of planting. It is not quite so hardy, however, and is a little more subject to shattering.

Sweet Sorghums—

1. Where irrigation is available, hence their longer growing period produces more dry matter per acre.
2. Pound for pound they are a little more nutritious than grain sorghums when made into silage and generally water does not have to be added.
3. When green feed is desired for soiling, for they renew their growth several times after cutting.

Indian Corn—

1. Where previous experience has proved its success. Indian corn is less adaptable to California climate than the grain sorghums.
2. Where summer temperatures are relatively warm and humid. Dry, hot winds often damage the crop severely.
3. Where irrigation is available. This crop requires more moisture than is usually available from rainfall only.

Corn is an excellent crop where it can be grown, for it produces more nutrients per acre than any other cereal. It can be most economically used when preserved as silage, as food for cattle.

Sudan Grass—

1. Where moisture conditions are inadequate for the production of sorghums. Sudan grass will grow on a more restricted supply of moisture than the sorghums.
2. Where costs of harvesting must be reduced. Tonnage of forage can be produced at less expense than corn or sorghums.
3. Where annual crops are desired on land that would otherwise have to be summer fallowed.
4. When alfalfa cannot be grown because of soil type or lack of water for irrigation.

If the land has been properly prepared during the previous fall or winter dwarf milo planted in May on good land in the Sacramento or San Joaquin Valleys, where rainfall is ten or more inches, may produce without irrigation from two to five thousand pounds of grain per acre. Under irrigation the upper limit may be readily obtained. One thousand pounds of grain sorghum when fed to pigs will produce about 200 pounds of pork. The gross yield of pork from an acre of grain sorghum may be, therefore, from 400 to 1000 pounds per acre. The beginner should expect the lower return, although the upper limit is not too high for an inexperienced man. As hogs had best be marketed at about 200 pounds, it will require one pig for each thousand pounds of grain sorghum raised. If bred twice a year a sow may raise eight pigs. On the basis of 2000 pounds of grain sorghum per acre, one sow to four acres would be required.

The above statements are based upon the exclusive feeding of

grain sorghum. This is, of course, not done because pigs require more protein and mineral constituents than can be obtained from grain sorghum. The usual source of this deficiency is alfalfa pasture, skim milk, wheat middlings, digester tankage, or similar packing-house by-products. In practice perhaps one-fourth of the food consumed will come from some other source than the grain sorghums. Inasmuch, however, as the sows must be maintained, the figures given above are sufficient guide to enable one to estimate the number of sows to be kept and the gross return which may be obtained from an acre of grain sorghum.

Grain sorghum is already extensively fed to poultry. Large quantities are shipped to poultry centers for this purpose. More of this grain, however, should be fed to poultry on the farm where the grain is produced. If an acre of dwarf milo produces 2000 pounds of grain, when supplemented with 500 pounds each of bran and shorts, it will be sufficient for the grain ration of fifty hens, which may reasonably produce 500 dozen eggs.

Hauser has discussed the use of grain sorghum where poultry are kept merely as an adjunct to other farming operations:

FEEDING POULTRY

With 2000 pounds of Egyptian corn, 500 pounds of bran, 500 pounds of shorts, 50 hens can be kept for one year assuming that they pick up 20% of their feed on range. This does not include feed for rearing chicks. Besides the above feeds, the fowls should be given table scraps and when available all the sour skimmed milk they will drink, which will be in the neighborhood of 15 to 20 pounds daily.

The birds should have an abundance of green feed, such as alfalfa, clover, beets, etc.

Plenty of clean, fresh water is necessary for egg production. A fowl's body is 55% water, an egg is 65% and one dozen eggs contain about one pint of water.

Only a light feed of grain sorghum should be given in the morning, so that the birds will be inclined to range and hunt for feed for themselves. Fowls should be given all the grain sorghum they will eat at night. The dry mash of equal parts of wheat bran and shorts should be before them all the time.

Hens are naturally grain eaters and would keep healthy if fed on a ration of grain alone, but they would not lay many eggs. A mash should be fed to hens because being already ground it is quickly digested and on that account may greatly assist in egg production.

If the average farm ration of corn was supplanted by hoppers filled with bran and shorts, and pans filled with sour skimmed milk, egg production would increase. The dry mash should be kept in a hopper before such fowls as Leghorns at all times. For older hens of the Plymouth Rock breed and other heavy breeds, the hopper *may* have to be kept closed until 1 P.M. each day, as these fowls have a tendency to eat too much mash and as a result become overfat.

Have plenty of oyster shells, grit and charcoal before the birds at all times.

Birds that are properly selected and properly housed ought to lay approximately 100 to 120 eggs per hen per year.

The time has now arrived when many farmers can profitably keep small flocks (say forty to fifty) of mutton sheep. The waste growth on many California farms can be profitably utilized by them under proper management. However, it will be found generally that some provision must be made against periods of the year when the sheep cannot obtain sufficient food from the waste material. Silage will supply this need. The latter will, of course, not be feasible for small flocks of sheep unless silage is required for dairy or beef cattle. A circular by Miller gives full, although concise, information concerning the management of sheep under valley conditions.

Up to the present time the production of beef, mutton, and wool in the western third of the United States has been largely dependent upon the native grasses. To some extent alfalfa has supplemented the feed in the winter and grain stubble in the summer. Finished beef, as understood by feeders in the central western states, is practically unknown on the Pacific coast. Unfortunately the necessary experimental data required to determine to what extent finished beef can be profitably produced is not at hand. It seems safe to assert, however, that much greater production of cereals and forage crops for the feeding of beef cattle is justified under existing conditions. Some stock men need to add farming to their activities and many farmers need to increase their live stock. At present prices the loss of 150 cattle during a season owing to starvation would pay for a large quantity of hay, if not for some grain in addition. A policy which permits large losses of cattle and sheep through starvation can hardly be considered a good public policy, though under past methods it may not have prevented individual feeders from making money.

In California perhaps the most important single item tending to increase animal production, including dairy products, is the building of silos. This is not because there are any magical food qualities in silage, but chiefly because if a stockman or dairyman has a silo he will raise something with which to fill it. This in California will be generally some crop which he has not hitherto raised. It is likely to be Indian corn, sweet sorghum, or Egyptian corn. The investigations at the University Farm at Davis indicate that the sweet sorghums are well adapted for silage purposes.

Madson reports having obtained without irrigation at the University Farm, Davis, during the past three years an average yield of 27.4 tons of green forage per acre with Honey Sorghum. The lowest yield was obtained from Early Amber, a dwarf, early-maturing variety, which gave an average yield of 12.4 tons per acre. Tavernetti reports average yields per acre of several silage crops during two seasons

with one irrigation as follows: Indian corn, 10.2 tons; milo, 11.3 tons; feterita, 10 tons; sudan grass, 12.2 tons; Early Amber sorghum, 13.4 tons; Honey sorghum, 19.3 tons; and Orange sorghum, 22.7 tons.[2] Taking ten tons as a basis, ten acres would be required to fill a 100-ton silo. A ton of silage is sufficient to feed fifty cows or an equal number of steers per day when fed with alfalfa. Thus, eight to ten acres is sufficient to raise the silage required for fifty head of cattle for 100 days.

The University of California, College of Agriculture will furnish plans and supervise without expense the building of silos by community effort. This work is usually conducted through the farm advisors in farm bureau centers. The College, however, will send representatives to any county when a community desires to construct a silo as an illustration for other farmers in the neighborhood. Materials cost about $1.50 per ton capacity. By growing Indian corn or sweet sorghum for silage there can be brought about large increases in the production of beef, mutton, wool, milk, butter and cheese. By the use of grain sorghums pork and egg production can be extensively increased.

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[2] Univ. of Cal. Agr. Expt. Sta. Bull. 282, p. 20.

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